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BOTANY.—*The North American species of Agonandra.* PAUL C. STANDLEY, U. S. National Museum.[1]

While working with the woody plants of Mexico, the writer has segregated from time to time from the undetermined Mexican plants in the National Herbarium a rather large number of sheets which evidently belonged to one genus. The specimens come from many widely separated localities, and although of rather characteristic general appearance, it is remarkable to find that none has ever been named generically or even referred to a family. Recently the writer determined that one of the forms had been named by DeCandolle, who applied the name *Schaefferia racemosa*, basing his description upon one of Sessé and Mociño's sketches of Mexican plants. It was evident, however, that the plant had nothing in common with the genus *Schaefferia*, which belongs to the family Celastraceae.

Careful examination of the Mexican material and comparison with the herbarium specimens available show that the former belong to the genus *Agonandra*, a member of the family Opiliaceae. Neither the genus nor the family has been reported heretofore from North America. Only one species of *Agonandra* has been described, a native of Brazil and Colombia, and it has been the only known American representative of the family, the other

[1] Published by permission of the Secretary of the Smithsonian Institution. Received September 21, 1920.

genera of the small group being restricted to Africa, Asia, Australia, and the East Indies. The occurrence of the genus in Mexico is a matter of considerable interest, and it is still more interesting in view of the fact that three species, apparently, are represented in Mexico. These are described below.

Agonandra Miers (Ann. Nat. Hist. II, **8**: 172, nomen nudum. 1851); Benth. & Hook. Gen. Pl. **1**: 349. 1862.

Shrubs or small trees, glabrous or pubescent; leaves alternate, petiolate, estipulate, entire, somewhat succulent, with inconspicuous venation; flowers very small, green, usually dioecious, racemose; calyx minute, cupular, obscurely 4 or 5 lobate; petals 4 or 5 in the staminate flower, narrow, the stamens 4 or 5, opposite the petals, alternating with conspicuous scalelike glands of the disk; petals none in the pistillate flower, the disk urceolate, surrounding the ovary; fruit a drupe, the seed erect.

KEY TO SPECIES

Leaves acute or acuminate at apex, or sometimes obtuse and abruptly pointed; young branches glabrous.....1. *A. racemosa.*
Leaves rounded or obtuse at apex; young branches finely puberulent.
Fruit 8 mm. long.....2. *A. obtusifolia.*
Fruit 15 mm. long.....3. *A. conzattii.*

1. Agonandra racemosa (DC.) Standl.

Schaefferia racemosa DC. Prodr. **2**: 41. 1825.

Shrub or small tree, 4 or 5 meters high, glabrous throughout, the branches very slender, green when young; petioles 4 to 9 mm. long; leaf blades lanceolate to broadly elliptic-ovate or even rounded, 4 to 7.5 cm. long, 1 to 4.5 cm. wide, cuneate to broadly rounded at base, pale beneath; racemes longer or shorter than the leaves, the flowers pedicellate; bracts acute or acuminate, covering the buds but caducous in anthesis; petals about 2.5 mm. long; fruit subglobose, about 8 mm. long.

SPECIMENS EXAMINED:

SONORA: Sierra de Alamos, 1890, *Palmer* 298.

SINALOA: La Rastra, alt. 600 meters, 1899, *Goldman* 361. Along road from Culiacán to Las Flechas, 1899, *Goldman* 313.

TEPIC: María Madre Island, May 11, 1897, *Maltby*.

COLIMA: Manzanillo, 1890, *Palmer* 1009.

MICHOACÁN or GUERRERO: Sierra Madre, alt. 480 meters, in granitic soil, *Langlassé* 860. San Marcos to Copala (Guerrero), alt. 60 to 150 meters, *Nelson* 2290.

Langlassé's specimen is remarkable for its narrow leaves; the vernacular name is given as "palo de golpe." One of Goldman's specimens (no. 313) bears fruit and staminate flowers upon the same branch, but all the other specimens of the genus examined are from dioecious plants, so far as the specimens show.

Some of the specimens agree excellently with Sessé and Mociño's plate,[2] upon which the species was based. This is far superior to many of the plates of the series, and shows plainly the scalelike glands of the disk in the staminate flower.

Agonandra racemosa is more nearly like *A. brasiliensis*, the type of the genus, than is either of the following species. In *A. brasiliensis* the staminate flowers are densely glandular-puberulent rather than glabrous.

2. Agonandra obtusifolia Standl., sp. nov.

Shrub, 1 to 3 meters high, with long stout spreading branchlets, these green, striate, and finely puberulent, the older branches gray; petioles 2 to 4 mm. long, puberulent; leaf blades narrowly oblong to oblong-ovate, 2 to 5 cm. long, 0.6 to 1.5 cm. wide, cuneate at base, glabrous; staminate racemes 1 to 2 cm. long, glabrous, borne on old wood, the flowers short-pedicellate; stamens 3 times as long as the petals; fruit subglobose, yellow.

Type in the U. S. National Herbarium, no. 572649, collected in the vicinity of Victoria, Tamaulipas, Mexico, altitude 320 meters, in 1907, by Edward Palmer (no. 421).

ADDITIONAL SPECIMENS EXAMINED:

TAMAULIPAS: Vicinity of Tampico, 1910, *Palmer* 507. Buena Vista Hacienda, June 16, 1919, *Wooton*.

VERACRUZ: Vicinity of Pueblo Viejo (near Tampico), 1910, *Palmer* 423.

Palmer gives the vernacular name as "granadillo," and Wooton as "revienta cabra." Palmer reports that the shrub grows in hedgerows or in rich wooded bottom lands; the leaves are light or dark green. The abundant fruit, he states, appears as if covered with honey dew; it has a sweet, watery flavor, but is not eaten by the natives.

Agonandra obtusifolia is easily distinguished from *A. racemosa* by the characters given in the key. The leaves average much smaller and narrower than in the latter species, and the petioles are relatively much shorter. The coarse, stiff branches indicate a different habit of growth.

[2] A.DC. Calq. Dess. Fl. Mex. *pl. 169, pl. V, B.*

3. Agonandra conzattii Standl., sp. nov.

Branches stiff, the young ones green, striate, minutely puberulent, the older ones grayish; petioles slender, 2 to 3 cm. long, minutely puberulent; leaf blades lance-oblong to oblong-ovate, 2 to 3 cm. long, cuneate-acuminate at base, rounded or very obtuse at apex, glabrous; fruit subglobose, 1.5 cm. long, the stout pedicels 5 to 6 mm. long.

Type in the U. S. National Herbarium, no. 1012311, collected at Portillo de Coyula, Distrito de Cuicatlán, Oaxaca, Mexico, altitude 1600 meters, April 23, 1919, by C. Conzatti (no. 3558).

A sterile specimen from Tehuacán, Puebla (*Rose & Rose* 11221), is probably the same species. Prof. Conzatti gives the vernacular name as "maromero."

Agonandra conzattii is related to *A. obtusifolia* more closely than to *A. racemosa*. It differs chiefly in the size of the fruit, which is twice as large as in *A. obtusifolia*. Several fruiting specimens of the latter species have been seen by the writer, and in all of them the fruit is very uniform in size; therefore it seems probable that the much larger fruit of the Oaxaca plant is a character of specific value.

ENTOMOLOGY.—*Notes on the Harris collection of sawflies, and the species described by Harris.* S. A. ROHWER, Bureau of Entomology.[1]

Harris wrote four papers[2] dealing with sawflies. Two of these were mere lists of the species and published as a part of a list of the animals and plants of Massachusetts. In these lists occur a number of new names unaccompanied by descriptions which stood as *nomina nuda* for many years. Later, in 1841, Harris characterized a few of these species but many of them remained *nomina nuda* until many years later, when Norton studied the Harris collection and described the new species. The unfortunate thing about this was that in describing the species Norton accredited the species to Harris and there has

[1] Received June 8, 1920.

[2] *List of the insects of Massachusetts*, in Hitchcock's Rept. Geol. Mineral. Bot. and Zool. Mass., 566–595. 1833. Sawflies treated on p. 586.

Ibid., second edition, enlarged, 553–601. 1835. Sawflies treated on pp. 582–584.

A report on the insects of Massachusetts, injurious to vegetation. Cambridge, 1841. Reprinted in 1842, second edition in 1852.

Sawfly of the raspberry; Selandria (Hoplocampa) rubi, New Engl. Farmer II, 2: 33. figs. 1850.

been some confusion as to whom the species should be accredited. Most of the species listed by Harris had been examined by Say and the names published by Harris were manuscript names supplied by Say. It is very fortunate that in describing the species Norton chose to use the names first proposed by Say.

In treating the species described by Harris it has been considered desirable to list all of the names for which no author was given, published in the second (1835) edition of the *Insects of Massachusetts*, and to make notes as to the present status of these names. Certain notes on the types of species described by Harris are also added, and notes on a few of Norton's species, the types of which are in the Harris collection, are appended.

The Harris collection of sawflies is now housed, in one drawer, in the Museum of the Boston Society of Natural History, Boston, Massachusetts. The specimens are carefully cared for and with the exception of damage done years ago are in a fair state of preservation.

Besides containing specimens determined by Norton and Harris there are in the collection specimens of certain species determined by Say. Some of these specimens belong to species which were previously described by Say. These specimens were years ago labeled as Say's types. They are not types in the usual understanding of the word, although certain of them might well be chosen as neotypes.

Mr. C. W. Johnson has kindly looked over the manuscript for this paper and under date of May 9, 1918, states he has marked the specimens here designated as types.

SPECIES LISTED IN 1835 CATALOGUE

Cimbex ulmi Harris, Cat. Ins. Mass. 586, nomen nudum. 1833; ed. 2, 582, nomen nudum. 1835; Ins. Injur. Veget. 374. 1841.

In the last reference the female is described, and the statement is made that the name is that used in the manuscript lectures of Peck and that "the male is *Cimbex Americana* of Dr. Leach."

Type female with no. 128 in Harris collection. Mr. C. W. Johnson has kindly examined this specimen and says it runs to var. *decimaculata* in MacGillivray's key.[3]

[3] Conn. Geol. Nat. Hist. Survey Bull. 22: 104. 1917.

Tenthredo (Schyzocera) **calceola** Harris, Cat. Ins. Mass. 582, nomen nudum. 1835.

This name was never published in connection with any description, but in the manuscript list of Harris under no. 173 the name is listed as having been supplied by Say. To this Harris has added a note that it is not a *Schizocera* but belongs to *Lophyrus*. Later Harris described part of the material under his number 173 as *Lophyrus abietis*, q. v.

Tenthredo (Lophyrus) **flavida** Harris, Cat. Ins. Mass. 582, nomen nudum. 1835.

A nomen nudum and not now represented by specimens in the Harris collection.

Tenthredo (Hylotoma) **scutellata** Harris, Cat. Ins. Mass. 582, nomen nudum. 1835.

Hylotoma scutellata Say, Boston Journ. Nat. Hist. 1: 211. 1836. Not Lepeletier, 1823.

A rather common species now known as *Agre sanguinea* (Klug.).

Tenthredo (Allantus) **sambuci** Harris, Cat. Ins. Mass. 586, nomen nudum. 1833; ed. 2, 582, nomen nudum. 1835.

Allantus epinotus Say, var. a (*A. sambuci* Harris) Norton, Boston Journ. Nat. Hist. 7: 258. 1860.

Macrophya epinotus Say, Norton, Trans. Amer. Ent. Soc. 1: 268. 1867, where *sambuci* is quoted in synonymy. Not *Macrophya sambuci* (Latrielle. 1805).

Norton in 1860 gave standing to the manuscript name *sambuci* of the Harris catalogue by associating it with variety *a* of *Macrophya epinota* (Say). The type specimen, no. 269 Harris collection, is apparently what I consider *Macrophya mixta* MacGillivray, but inasmuch as the name *sambuci* is preoccupied there is no change necessary.

Tenthredo (Allantus) **media** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1860 as a variety of *Macrophya bifasciata* (Say) and now considered as a synonym of it.

Tenthredo (Allantus) **tacita** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1860 and now considered a good species in *Strongylogaster*.

Tenthredo (Allantus) **melisoma** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A name given standing by Norton in 1860 when he considers it a synonym of *Strongylogastroidea terminalis* (Say).

Tenthredo (Allantus) **trosula** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1860 and now considered a good species of *Macrophya*.

Tenthredo (Allantus) **trisyllabus** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1860 and now considered a good species of *Macrophya*.

Tenthredo (Allantus) **atroviolacea** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1860 and now considered a good species in the genus *Lagium*.

Tenthredo (Allantus) **obesa** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1860 and now[4] considered as the correct name for *Eriocampa rotunda* (Norton).

Tenthredo (Allantus) **marginicollis** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and now known as *Periclista marginicollis* (Norton). The type, in Harris collection under no. 268, lacks antennae but is otherwise in good condition.

Tenthredo (Allantus) **coronatus** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A name given standing by Norton in 1860 when he quoted it in synonymy with (*Allantus*) *Tenthredo basilaris* Say. Type in Harris collection under no. 310.

Tenthredo (Allantus) **tarda** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1860 and now placed in the genus *Lagium*.

Tenthredo (Selandria) **vitis** Harris, Cat. Ins. Mass. 586. 1833; ed. 2, 583. 1835; Ins. Injur. Veget. 378. 1841. Norton, Proc. Boston Soc. Nat. Hist. **8**: 219. 1861.

Selandria vitis Harris, 1832. A discourse delivered before the Mass. Soc. on fourth anniversary, published in New England Farmer. Page and reference unknown. See account in 1841.

[4] MacGillivray, Can. Ent. **40**: 368. 1908.

This species has usually, and correctly, been accredited to Harris and is, as pointed out by Norton, a synonym of *Erythraspides pygmaea* (Say). Type, allotype, and a paratype male under no. 172 in Harris Collection.

Tenthredo (Selandria) **barda** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Say in 1836 and now referred to the genus *Tomostethus* where it is a good species.

Tenthredo (Selandria) **pygmaea** Harris, Cat. Ins. Mass. 583. 1835.

This refers to *Erythaspides pygmaea* (Say), described in 1824.

Tenthredo (Selandria) **halcyon** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1861 and now considered a good species in *Hoplocampa*. Type in Harris collection under no. 266, nothing but wings and enough of thorax and legs to keep them on pin.

Tenthredo (Dosytheus) **aprica** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

A species described by Norton in 1861 and now known as *Dolerus apricus* (Norton). Type in Harris collection under no. 311.

Tenthredo (Emphytus) **tarsata** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Say in 1836 and now known as *Macremphytus tarsatus* (Say).

Tenthredo (Emphytus) **mellipes** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and now known as *Emphytus mellipes* Norton. Type in Harris collection under no. 122. The Maine specimen is so badly damaged that the specimen from New Hampshire is chosen as lectotype.

Tenthredo (Emphytus) **aperta** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and now known as *Emphytina aperta* (Norton). Type female and allotype male in Harris collection under no. 178.

Tenthredo (Nematus) **integra** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Say in 1836 and now known as *Pteronidea integra* (Say).

Tenthredo (Nematus) **melanocephala** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Never described, name used by Hartig in 1837.

Tenthredo (Nematus) **ventralis** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Refers to a species described in 1824 by Say and now known as *Pteronidea ventralis* (Say).

Tenthredo (Nematus) **pallicornis** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and treated by Marlatt as *Pontania*. Marlatt is in error, the type is in Harris collection and bears no. 183. It is synonymous with *Diphadnus appendiculatus* (Hartig).

Tenthredo (Nematus) **fulvipes** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Species described by Norton in 1861 but name preoccupied by Fallen. The type of Norton's species is under no. 357 in Harris' collection and is a single male in poor condition. What Marlatt considered as this is now known as *Amauronematus semirufus* Kirby. Norton's type is not *Amauronematus*, but the name *fulvipes* is preoccupied,

Tenthredo (Nematus) **labrata** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861. The type is under no. 182, Harris collection, but notes have been lost and standing of species will have to be investigated.

Tenthredo (Nematus) **stigmatus** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861. The type is a single female with the head and thorax badly eaten and is under no. 435 in Harris collection. It is what is now known as *Pachynematus extensicomis* (Norton) and is a synonym of that species.

Tenthredo (Nematus) **monochroma** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861. The type is under no. 436 in Harris collection. It has only thorax, right wings (except apex) and right hind leg to tarsus remaining. These remains do not indicate that Marlatt was correct in placing this species in *Pteronidea*. It seems that it is *Amauronematus* and Dyar[5] was probably correct in 1894 when he considered the species which Marlatt later described as *Amaurone-*

[5] Can. Ent. 26: 187. 1894.

matus dyari as this species. The thorax, however, also suggests that it may be *Pachynematus* but in that genus there is nothing which *monochroma* can be; *P. apiceae* Rohwer comes nearest. Until what remains of the type has been carefully compared with a number of different species the standing of *monochroma* Norton must remain uncertain.

Tenthredo (Cladius) **isomera** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861. The type is a rather dirty female under no. 185 in the Harris collection. In 1892 Riley synonymized Norton's species with the common European species, *Cladius pectinicornis* (Foucroy), but a recent study of American and European material demonstrates that the two are not the same and makes it necessary to reinstate Norton's name. The differences between the two forms are discussed in detail in a paper on the Cladiinae now in press.

Tenthredo (Lyda) **maculiventris** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1869. There is no specimen of this species in the Harris collection and there seems to be no doubt that the type is lost although it is possible that the paratype is in the Cambridge Museum. MacGillivray[6] recognizes this species and places it in *Itycorsia*.

Tenthredo (Lyda) **ochracea** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1869 and now placed in the group *Itycorsia*. Not in Harris collection but a specimen from "Mass." in Academy of Natural Sciences of Philadelphia is undoubtedly the type.

Tenthredo (Lyda) **rufofasciata** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1869 and now correctly treated by MacGillivray[7] as *Anoplolyda*. The type is somewhat imperfect and is no. 382, Harris collection. Paratypes are in Philadelphia. The type locality is, according to Harris' manuscript list, Dublin, New Hampshire.

Tenthredo (Lyda) **calceata** Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

This has never been described.

[6] Conn. Geol. Nat. Hist. Survey Bull. **22**: 33. 1917.
[7] Conn. Geol. Nat. Hist. Survey Bull. **22**: 41. 1917.

Xyela infuscata Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and correctly treated by MacGillivray[8] as *Macroxyela*. The type is no. 186 in Harris collection. It is in good condition and according to Harris' manuscript list was collected April 25, 1827.

Cephus abbreviatus Harris, Cat. Ins. Mass. 583. 1835.

This was described by Say in 1824.

Cephus integer Harris, Cat. Ins. Mass. 583, nomen nudum. 1835.

Described by Norton in 1861 and now correctly treated as *Janus*. Type a single female in good condition under no. 354 in Harris collection.

Cephus heteropterus Harris, Cat. Ins. Mass. 584, nomen nudum. 1835.

Described by Norton in 1861. The type is lost, but a paratype which lacks the head and has part of the thorax eaten away is in Harris collection under no. 314, and according to Harris' manuscript list came from Dublin, New Hampshire. This species is undoubtedly synonymous with *Janus abbreviatus* (Say). The differences mentioned by Norton are not specific as they exist in a reared series now in the National Museum. The venation of the paratype is abnormal.

Cephus filicornis Harris, Cat. Ins. Mass. 584, nomen nudum. 1835.

This was given standing by Norton in 1861 in connection with the description of *Cephus integer*. The specimen he examined is damaged and is in the Harris collection under no. 283. It is, as stated by Norton, the male of *integer*.

Xiphydria albicornis Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 392. 1841.

This species is correctly synonymized with *Xiphydria maculata* Say. The type is the New Hampshire specimen under no. 302 in Harris collection. The type locality is Dublin, New Hampshire, according to Harris' manuscript list. Type locality determined by list and published statement that he is indebted to L. W. Leonard for the specimens.

Xiphydria mellipes Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 392. 1841.

Type a single female under name *Xiphydria tibialis* Say and bearing

[8] Conn. Geol. Nat. Hist. Survey Bull. 22: 32. 1917.

Harris' no. 303 in Harris collection. This specimen, according to Harris' manuscript list, was collected by L. W. Leonard at Dublin, New Hampshire (the type locality test, the published statement that Harris was indebted to Leonard for specimens), and was sent under no. 1457. This specimen is in fair condition but lacks the antennae, except the right scape and pedicel.

This species has been synonymized incorrectly with *Xiphydria maculata* Say. It is the same as and will replace the name of the species which the author[9] treated under the name *provancheri* Cresson.

Oryssus haemorrhoidalis Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 394. 1841.

The type is in good condition but mounted on a pin which is badly verdigrised. It is in Harris collection under no. 304 and according to the Harris manuscript list was collected at Dublin, New Hampshire, by L. W. Leonard. The type agrees with the treatment given by the author[10] in 1912, but in a paper now in press the necessity of uniting *terminalis* and *haemorrhoidalis* is pointed out.

Oryssus maurus Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 394. 1841.

The type is in good condition and in the Harris collection under his no. 305. It and a paratype under no. 1033 were collected at Dublin, New Hampshire, by L. W. Leonard, according to the manuscript list of Harris. No specimens agreeing with the type or paratypes have been seen and although this is very likely *sayii* Westwood, it seems best to delay a definite statement.

Oryssus affinis Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 394. 1841.

Type in good condition, except that the apices of the antennae have been eaten, in Harris collection under no. 306. According to the manuscript list the type was collected at Dublin, New Hampshire, by L. W. Leonard. This is undoubtedly the same as *sayii* Westwood, as treated by the writer.[11]

Sirex abdominalis Harris, Cat. Ins. Mass. 584, nomen nudum. 1835; Ins. Injur. Veget. 392. 1841.

Three males under no. 355 in the Harris collection. According to the manuscript list these were collected at Boston, Cambridge and

[9] Ent. News **29**: 109. 1918.
[10] Proc. U. S. Nat. Mus. **43**: 151. 1912.
[11] Proc. U. S. Nat. Mus. **43**: 152. 1912.

Milton (1832) and are all the same species, although one of them is smaller and lacks the head. These agree with Bradley's interpretation of the species,[12] and are the same as *flavicornis* (Fabricius).

OTHER SPECIES DESCRIBED BY HARRIS

Besides the species listed in the 1835 Catalogue, many of which were not described by Harris, certain other species were described by Harris in some of his economic papers. A list of these with notes on the types follows:

Urocerus nitidus Harris, Ins. Injur. Veget. 391. 1841.

Type a badly eaten specimen in the Harris collection under no. 448 and with name label *cyaneus*. That this is the type is proven by the manuscript list, which also adds that it was collected at Dublin, New Hampshire, by L. W. Leonard. What is left of this specimen proves that it is correctly synonymized with *Sirex cyaneus* Fabricius by Bradley.[13]

Lophyrus abietis Harris, Ins. Injur. Veget. 376. 1841.

Under this name in the Harris collection there are two males and two females. One of the females is on a long pin and bears no number label and has not been considered as part of the type material. The other three specimens bear the no. 173 which in the Harris manuscript list refers to "*Schyzcera calceola* S. n. sp." with the added note that Say is wrong and that it "belongs to *Lophyrus*." There is also an account of one specimen collected on pitch pine and specimens reared from larvae on fir. One of the males is a *Monoctenus*, the other is *Diprion* but badly eaten. The remaining female, which is without appendages, must be the type. It is the same as that treated by Norton and is the one now treated under that name. The species will be treated in more detail in a later paper.

Selandria rosae Harris, Ins. Injur. Veget. 380. 1841.

The type of this species seems to be lost, but, in view of the description and biological notes, there can be no doubt that it is *Caliroa aethiops* (Fabricius).

Selandria rubi Harris, Address N. Darling, New Haven, 13. 1845; Norton, Proc. Boston Soc. Nat. Hist. **8**: 221. 1861. (Treated in subgenus *Hoplocampa*.)

[12] Journ. Ent. Zool. 5: 18. 1913.
[13] Journ. Ent. Zool. 5: 14. 1913.

The type is a single female specimen in the Harris collection without a number but with a name label which is folded to hold a detached wing. This specimen is badly broken but enough remains to make it certain that our present understanding of it as *Monophadnoides rubi* (Harris) is correct.

OTHER TYPES IN HARRIS COLLECTION

Besides the types and species listed above the Harris collection also contains certain other types. These are listed below.

Trichiosoma bicolor Norton, Proc. Boston Soc. Nat. Hist. **8**: 150. 1861.

The specimen mentioned in the original description as in the Harris collection is a paratype and is now in the Harris collection under no. 511. According to the manuscript list this came from Maine (Randall 1836). This specimen is the same species as described by MacGillivray[14] under the name *confusum*.

Allantus dubius Norton, Proc. Boston Soc. Nat. Hist. **7**: 241. 1861.

Two specimens, both which lack head and most of the abdomen, are in the Harris collection under no. 393 and are types.

Nematus bivittatus Norton, Proc. Boston Soc. Nat. Hist. **8**: 158. 1861.

Type a single female in Harris collection under no. 184, in good condition, except that it is dirty and on a disk so it cannot be seen well. There is another different female, under no. 184, which is not a type. This species is correctly treated by Marlatt.

Allantus tricolor Norton, Journ. Boston Soc. Nat. Hist. **7**: 247. 1860.

Type in Harris collection under no. 515.

Allantus angulifer Norton, Journ. Bos. Soc. Nat. Hist. **7**: 252. 1860.

Paratype in Harris collection under no. 430.

Allantus mellinus Norton, Journ. Boston Soc. Nat. Hist. **7**: 248. 1860.

Type and allotype in Harris collection under no. 516.

Allantus signatus Norton, Journ. Boston Soc. Nat. Hist. **7**: 247. 1860.

Type and one paratype (broken) in Harris collection under no. 431. According to Harris' notes the type locality is Hallowell, Maine.

[14] Conn. Geol. Nat. Hist. Survey Bull. **22**: 103. 1917.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

GEOLOGY.—*Geothermal data of the United States.* N. H. DARTON. U. S. Geol. Survey Bull. **701.** Pp. 97, pl. 1, figs. 3. 1920.

A compilation, by States, of all available data on observations of temperatures below the surface of the earth. Several hundred of these were taken by the writer and his associates with the Darton maximum self-registering thermometer, a slight modification of that used by William Hallock. The geologic relations of the wells in each State are discussed. In most wells that penetrate sedimentary rocks not greatly disturbed, there seems to be no distinct relation between the formation penetrated and geothermal gradient. A striking exception is the Des Moines well in Iowa which shows a sudden change from a rate of increase of 1° in 75 feet above the Devonian to 1° in 272 feet below the top of it. The Comstock Lode, Nevada, is noted as a well-known instance of the influence of hot volcanic material below the surface in raising the geothermal gradient. In the State of Washington heat from old lava flows is assumed to be the cause of unusually hot flows of water from wells. Unusually low gradients in the Northern Peninsula of Michigan have been ascribed to the proximity of Lake Superior. By means of a map it is shown that in South Dakota the temperature gradient increases very regularly with the depth below the surface of the granite and quartzite bedrock floor on which the Upper Cretaceous was deposited.

M. I. GOLDMAN.

GEOLOGY.—*Oil in the Warm Springs and Hamilton domes near Thermopolis, Wyoming.* A. J. COLLIER. U. S. Geol. Survey Bull. **711**-D. Pp. 13 (61–73), pls. 4, fig. 1. 1920.

The Warm Springs domes are two high places on the east end of the Thermopolis anticline and the Hamilton dome is a short distance west of its west end. The Thermopolis anticline is a well-known and well-marked arch of the rocks extending about 22 miles northwest

through Thermopolis, where it has some large hot springs and travertine deposits near its crest. The anticline is not symmetrical, since the dips are about 45° on the south side and 7° on the north side. The rock formations involved belong to the Cretaceous, Jurassic, Triassic, and Carboniferous systems. In the Warm Springs domes about 4 miles east of Thermopolis the Chugwater, a Triassic formation, is exposed at the surface, and the oil sand is reached in the Carboniferous-Embar group. In the Hamilton dome the rocks exposed at the surface are Cretaceous, and the productive sand is in the Triassic-Chugwater formation. Unlike the light high-grade Cretaceous oils found in Wyoming the oil from the Warm Springs domes is heavy and dark. Its specific gravity is about 19.1° Baumé. That produced in the Hamilton dome is of a little better grade than the Warm Springs oil, having a gravity of nearly 23° Baumé. The production of the Warm Springs domes is given as about 1000 barrels per day. No production is given for the Hamilton dome, as the oil had been struck too recently to justify an estimate. A. J. C.

GEOLOGY.—*Gas in the Big Sand Draw anticline, Fremont County, Wyoming.* A. J. COLLIER. U. S. Geol. Survey Bull. 711-E. Pp. 9 (75–83), pl. 1, figs. 2. 1920.

The Big Sand Draw anticline, 18 miles southeast of Riverton, Fremont County, Wyoming, is so largely concealed by overlying rocks that it was impossible to say whether it was a pitching fold or one of the most promising anticlines of the region.

The rocks involved are the Tertiary, White River and Wind River formations which unconformably overlie the Cretaceous, Mesaverde, Steele, Niobrara, Carlile, and Frontier formations. At the north end of the anticline the Mesaverde formation and Steele shale are exposed, showing on the west limb a dip of 43° and on the east limb a dip of 25°. Farther south there are occasional exposures of the Steele shale showing dips to the east. The overlying Wind River formation is apparently also folded into an anticline but with very low dips.

In 1918 two wells were put down, striking gas rated at 7000 and 10,000 cubic feet per day. The gas is contained in one of the Frontier sands locally called the Wall Creek sand.

The field will be tested further to determine whether or not oil may be found either in the wells already drilled or in wells lower down on the flanks of the anticline. A. J. C.

GEOLOGY.—*The Abram Creek-Stony River coal field, northeastern West Virginia.* GEORGE H. ASHLEY. U. S. Geol. Survey Bull. 711-F. Pp. 19 (85–103), pls. 2. 1920.

The report describes the Abram Creek-Stony River coal field in Grant, Mineral and Tucker counties, West Virginia. The area is of special interest because it contains a large body of low-volatile semi-bituminous coal nearer to tidewater than any other Appalachian coals except those of the Georges Creek and Upper Potomac fields. The field is undeveloped and without railroads but requires only a few miles of branch roads to connect with Baltimore and Newport News. The coals are found in the Pottsville, Allegheny and Conemaugh formations; they occur in a score of beds ranging in thickness from $1^1/_2$ to 20 feet, of which three beds are widely minable in the area studied. All the beds are more or less broken up by partings. A number of analyses are given, and show that the coals of this field are of lower grade than any of the competing coals now on the market, averaging 11.4 per cent of ash and 2.31 per cent of sulfur, with a heating value of 13,100 B.t.u. The estimated recoverable tonnage of the three principal beds is 422,760-000 tons. J. D. SEARS.

GEOLOGY.—*Geology and oil and gas prospects of the Huntley field, Montana.* E. T. HANCOCK. U. S. Geol. Survey Bull. 711-G. Pp. 44 (105–148), pls. 4, figs. 2. 1920.

The Huntley field, in Yellowstone and Big Horn counties, is in reality an eastward extension of the Lake Basin field, described by the same author in U. S. Geol. Survey Bull. 691-D. Rich alluvial deposits and gravel terraces border the Yellowstone, while south of the river the interstream areas are commonly high table lands. Surface rocks include strata of the Colorado, Eagle, Claggett, Judith River, Bearpaw, Lance and Fort Union formations, with later gravels and alluvium. The long narrow zone of faults extending across the Lake Basin field was observed to continue eastward across the Huntley field, demonstrating a belt almost 100 miles in length. The structure of the area is considered in its relation to the major uplifts of south-central Montana and central Wyoming. A few structural features are pointed out which seem favorable for accumulations of oil and gas, and a discussion is given of the factors that should be considered by anyone who contemplates drilling in this field. J. D. SEARS.

GEOLOGY.—*Preliminary report on the chromite of Kenai Peninsula, Alaska.* A. C. GILL. U. S. Geol. Survey Bull. **712**-D. Pp. 31 (99–129), pls. 3. 1919.

The chromite deposits of Kenai Peninsula are situated at two localities near the southwest end of the peninsula. One of these, the Claim Point property near the coast, is the only producer of chrome ore in Alaska, and furnished about 1000 tons yearly in 1917 and 1918. The chromite occurs in masses of dunite, which are surrounded by beds of more or less metamorphosed clastic rocks, chiefly slates and graywackes. The outstanding peculiarity of the Kenai Peninsula chromite bodies is their continuity for considerable distances in the shape of bands or layers, as contrasted with the "pockety" character exhibited by such ores at most localities. Estimates of exportable ore are: Port Chatham (at coast), above tide level, 32,300 tons; below tide level, 12,600 tons; Red Mountain (interior) 195,600 tons.

J. D. SEARS.

GEOLOGY.—*Placer mining in the Tolovana District, Alaska.* R. M. OVERBECK. U. S. Geol. Survey Bull. **712**-F. Pp. 8 (177–184). 1920.

Mining in the Tolovana district in 1918 was practically restricted to the gold placer deposits in the vicinity of Livengood, north of Fairbanks. Other minerals occurring in the district, not yet known in sufficient quantity to be of economic importance, are chromite, scheelite, stibnite, and possibly platinum. The value of the output of placer gold in the Tolovana district in 1918 was about $875,000, compared with $1,160,000 in 1917. This is about 15 per cent of the total placer gold production of Alaska in 1918, and gives the Tolovana district second place. The deposits of Livengood Creek and its branches are described, of which most are buried or bench placers. The paper is supplementary to a report on "The Gold Placers of the Tolovana District" by J. B. MERTIE, JR. (U. S. Geol. Survey Bull. **662**: 221–277, 1917).

J. D. SEARS.

GEOLOGY.—*The Upton-Thornton oil field, Wyoming.* E. T. HANCOCK. U. S. Geol. Survey Bull. **716**-B. Pp. 18 (17–34), pl. 1, fig. 1. 1920.

The report deals with an area on the southwest flank of the Black

Hills at the boundary of Weston and Crook counties in northeastern Wyoming. Of the rocks exposed the highest is about 1200 feet above the base of the Upper Cretaceous Pierre shale, the lowest about 100 feet above the basal Upper Cretaceous Dakota sandstone. From the records of nearby borings about 2830 feet of rocks beneath this, to a depth of 398 feet in Mississippian limestone, are described. The structure is represented by contours at 50-foot intervals and by diagrammatic cross sections. The general southwest dip of the region is interrupted in the Upton and Thornton domes which lie along a common axis trending parallel to the general strike. Dips range from a few degrees to 25°. The Thornton dome is about 2 miles wide by 6 long and rises about 500 feet above the syncline which bounds it on the east. The Upton dome is about $1^1/_2$ miles wide and 4 long, and about 100 feet high. The only developments on these domes are two dry holes apparently well located and drilled to the red beds, but a number of wells are daily producing 5 to 10 barrels of high-grade light oil from a sandstone immediately above the Greenhorn limestone, lying 450 to 850 feet below the surface in a structural terrace about a mile long and wide just beyond the northwest nose of the Thornton dome, which is the more northerly of the two domes.

M. I. GOLDMAN.

GEOLOGY.—*The Sunset-Midway oil field, California.* Part II. *Geochemical relations of the oil, gas and water.* G. S. ROGERS. U. S. Geol. Survey Prof. Paper 117. Pp. 103, pls. 2, figs. 8. 1920.

Part I of this paper describes the general geology of the Sunset-Midway region and the development and underground conditions in the productive field, and discusses also the origin and migration of the oil. California petroleum differs in many important respects from the varieties produced in other parts of the United States, and a considerable amount of chemical study has been devoted to it. Part II describes the chemical and physical properties of the California oil and gas, and discusses the relations of these properties to the geologic occurrence, emphasizing especially the importance of the chemical action of mineralized water as a cause of variation in gravity of the oil and the formation of carbon dioxide in the gas. The paper includes also some figures on the geothermal gradient, and a discussion of the occurrence and nature of oil-field waters and their invasion of oil sands.

J. D. SEARS.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY

832ND MEETING

The 832nd meeting was held at the Cosmos Club, March 13, 1920. President SOSMAN presiding and 35 persons present.

W. W. COBLENTZ: *Some characteristics of spectro-photoelectrical sensitivity in solids.*

In introducing the subject the speaker said that numerous solid substances, which have a low electrical conductivity in the dark, have a high electrical conductivity when exposed to light, selenium being the most widely known example. This photo-sensitive property is a function of the temperature of the substance; also of the intensity and of the wave length of the thermal radiation stimulus. It is found that the photo-electrical response of substances in general is fairly regular throughout the visible spectrum, terminating in a band or bands of high sensitivity in the extreme red or near infra-red spectrum. On decreasing the temperature of the substance, its intrinsic photo-electrical sensitivity is greatly increased throughout the whole spectrum and the point of maximum sensitivity is shifted toward the short wave lengths.

On a few rare occasions experimenters have observed that on exposure of selenium to light from an incandescent lamp the galvanometer gave a negative deflection, indicating an apparent rise in resistance which is higher than that which obtains in the dark, whence the name "photo-negative response." In one case, using light dispersed into a spectrum, it was observed in a sample of stibnite (Sb_2S_3) that this photo-negative property is caused by yellow and green light (wave lengths less than 0.65μ), whereas the red and infra-red rays produced a photo-positive reaction.

Molybdenite is a natural sulfide of molybdenum, some samples of which mineral are photoelectrically sensitive. In addition to the photo-positive properties just described, the speaker presented observations on a photo-negative reaction which was found localized in a small spot, perhaps 1 mm. in diameter, in the crystal. This photo-negative property appears to depend upon the magnitude of the potential applied to the crystal, and is produced by wave lengths less than 0.65μ. Furthermore, this photo-negative property seems to depend not only upon the magnitude of the potential applied but also upon the direction of the current through the crystal. The photo-positive action is the same as a resistance decrease caused by a rise in temperature of the molybdenite. The photo-negative reaction is similar to the building up of a counter e. m. f.

In this work the radiation stimuli of different wave lengths were of equal energy value. Hence, if this phenomenon were the result of heating and of electrolytic action, the photo-positive response should occur in the short wave lengths where the absorption is the greatest in the crystal, and the photo-negative response should occur in the long wave lengths, where the photo-electric reaction is the greatest. In this respect, the observed phenomena are just the reverse of what one would expect.

Discussion: This paper was illustrated by lantern slides and was discussed by Messrs. SOSMAN and HAWKESWORTH.

S. M. BURKA: *Hypersensitizing commercial panchromatic plates.*

Ordinary photographic plates, which owe their sensitivity to the silver halides alone, are sensitive only to the violet and blue regions of the spectrum. If, however, suitable dye-stuffs be added, either by the laboratory method of bathing the plates in a solution of the dye, or by the commercial method of incorporating the dye in the emulsion, the plates become sensitive to other regions.

The effect of ammonia on the sensitivity of commercial plates containing dyes was investigated. As a result of numerous trials, using varying concentrations of ammonia, the procedure finally adopted was to bathe the plates before exposure for four minutes at 16° to 18° C. in a solution of 3 cc. ammonia (20 per cent NH_3) in 75 cc. water and 25 cc. ethyl alcohol and dry as rapidly as possible. They were then exposed in a grating spectrograph and the spectral sensitivity determined. In a number of cases the speed was also determined by a sensitometer of the Chapman Jones type, and by the Hurter and Driffield method.

The sensitivity of orthochromatic (sensitive to green and yellow) plates showed, with one exception, no appreciable change. Every panchromatic (sensitive to all colors) plate tried (nearly a dozen different brands) had its speed increased at least 100 per cent to white light and over 400 per cent to red. The sensitivity was also extended 100 or more Angstrom units into the red. The strong minimum in sensitivity in the green shown by most plates was to a great extent smoothed out. The most striking increase in sensitivity was shown by a Wratten and Wainright panchromatic plate which was used three years after its "expiration" date. The speed was increased over 600 per cent throughout the region from H_β to beyond H_α.

The action of the ammonia seems to be specific towards the pinaverdol and pinacyanol series of dyes. Practically all orthochromatic plates are dyed with erythrosin. The exceptional plate mentioned above is a pinaverdol plate.

Bathing a plate after exposure but before development has no effect on the speed.

The ammoniated plates deteriorate rapidly, showing chemical fog in development, so that most brands are useless four or five days after treating. The plates should, therefore, be used a day or two after

ammoniating and overdevelopment should be avoided. They should also be kept cool. If the plates are used immediately after drying, greater increase in sensitivity can be obtained by omitting the alcohol from the bath and using $3^1/_2$ cc. ammonia to 100 cc. of water.

Discussion: This paper was also illustrated by lantern slides and was discussed by Messrs. SOSMAN, WHITE, HUMPHREYS and Miss KLEINSCHMIDT.

H. S. BOYD and C. G. PETERS: *The calibration of precision end gages.* The paper was presented by Mr. BOYD. Precision end standards or gages, which are blocks of hardened steel or of other materials made with two opposite faces plane, parallel and a specified distance apart, are used as master gages for precise mechanical work. The fact that these gages are made so nearly perfect that it is impossible to determine their errors with any contact micrometric instrument has necessitated the use of interference apparatus and methods for their calibration. With these methods, developed at the Bureau of Standards, the above mentioned properties of gages can be determined with an error of only a few millionths of an inch. In testing the planeness of the gage surface a plane glass test plate is placed in contact with the surface and illuminated with monochromatic light. The planeness of the surface is determined from the shape of the interference fringes. The length of the gage is obtained by comparison with the standard light waves. An interferometer mirror is placed in contact with each end of the gage, thus forming a Fabry and Perot interferometer. The length of the gage is then determined from the number of waves of known length between the two interferometer plates. When the interferometer constructed in the manner just described is viewed in parallel monochromatic light, the parallelism of the gage surfaces can be determined from the expansion or contraction which takes place in the ring system when the eye is moved perpendicular to the line of sight. After gages of various sizes have been standardized other gages can be calibrated by comparison with these standards. To accomplish this a standard and an unknown gage are placed in contact with a plane plate of glass. Another plane plate of glass placed over the gages is illuminated with monochromatic light to show straight fringes. The difference in the length of the two gages is determined from the relative displacement of corresponding fringes.

Discussion: The paper was illustrated by lantern slides and was discussed by Messrs. WHITE, PETERS, MUELLER, SOSMAN, FERNER, TUCKERMAN and L. J. BRIGGS. A number of gages were exhibited by Mr. BOYD.

S. J. MAUCHLY, *Recording Secretary.*

ENTOMOLOGICAL SOCIETY OF WASHINGTON

328TH REGULAR MEETING

Held February 5, 1920, at the Cosmos Club, with President WALTON presiding, and 30 members and 3 visitors present.

The recording secretary made a statement regarding the importance of speakers furnishing him with abstracts of their remarks and announced that hereafter speakers will be furnished with blank forms for abstracts

New member: EDWARD A. CHAPIN of the Biological Survey.

The regular program was as follows:

N. E. MCINDOO: *The olfactory sense in Orthoptera.* In making a comparative study of the disposition of the olfactory pores in Orthoptera, both sexes of 21 species belonging to 20 genera and representing the 6 families were examined. Olfactory pores are more widely distributed in Orthoptera than in any of the higher orders of insects. They are always found on the legs, antennae, and anal stylets; usually on the wings (if present), abdominal segments, cerci, head, and all the mouthparts; and sometimes on the thoracic segments and ovipositor. Relative to the antennae a few usually lie on the first segment, but always many on the second segment. In regard to the total number of pores found, mantids and phasmids have the smallest number, certain acridids have the largest number, while the remaining species have a median number of about 1000. The newly hatched croton bug has 44.5 per cent as many pores as the adult female, and also the pores in the six instars of the grasshoppers gradually increase from 46 per cent in the first instar to 100 per cent in the adult female. Externally these organs are usually oblong, sometimes almost slit-shaped, but the eye-shaped type is the most common. Internally each one has a spindle-shaped sense-cell whose peripheral end unites with the pore aperture in the chitin, thus allowing the external air to come into direct contact with the nerve. Experiments were performed on grasshoppers and crickets to determine whether the so-called olfactory organs on the antennae receive olfactory stimuli. Since the antennae were cut off just distal to the olfactory pores on the first and second segments it appears from the reaction times obtained that the remainder of the antennal segments, which bear the so-called olfactory organs, do not serve as an olfactory receptor as other investigators claim.

In answer to questions by various members, Dr. MCINDOO stated it as his belief that the antennal organs commonly supposed to be olfactory are tactile, and serve for the detection of air currents; that evidence of the olfactory nature of the organs he had discussed was obtained by removal of appendages and painting over the other organs with beeswax and vaseline; and that in order to eliminate the element of shock he had delayed his experiments for 24 hours after mutilation. Mr. MIDDLETON questioned Dr. MCINDOO on whether all the types of organs represented (those he interpreted as olfactory and those believed by others to furnish insects with that sense) were found mixed together in the same locality or cluster, suggesting that if not, by eliminating certain types of organs by coating those portions of the body wall containing them, the true organs might be determined and that some further information on the constitution of an odor might be

arrived at through a study of the structure of the organs whose irritation or disturbance gave rise to reactions indicating olfactory sense. Dr. BÖVING discussed certain organs on coleopterous larvae the function of which he did not know. These structures are similar in form to certain of the organs discussed by Dr. MCINDOO. Dr. QUAINTANCE thought that such studies should lead to practical use of the knowledge gained and suggested that some substance distasteful to bees might be placed in sprays and thus eliminate the serious loss in hives due to bees feeding on sprayed flowers.

Symposium on laboratory methods and devices for breeding and rearing insects.

J. A. HYSLOP: *Subterranean insects.* The technique described was developed during ten years of biological and ecological investigations on the coleopterous family Elateridae with occasional studies on other insect groups. The unit system universally used in library indexing was found to be admirably adaptable to this work. Each specimen on being received at the laboratory was isolated in an individual cage and given an accession number in chronological sequence. A 3 × 5 card bearing this number was prepared and all collecting data were recorded. Subsequent notes were recorded on similar cards and the cards filed in numerical order. The cages were tinned salve boxes ranging in size from one inch in diameter and one-half inch in depth to two and one-half inches in diameter and one inch in depth, depending upon the size and nature of the material. These cages were arranged in numerical order in shallow galvanized iron trays measuring 18 × 24 inches and the trays filed in sequence in slide stacks below the work bench in the laboratory insectary, each tray bearing on its exposed edge the first and last accession numbers contained in that tray. By systematizing the method of procedure in examining this material and in making notes it was possible, with two inexperienced laboratory assistants, to keep careful daily records of over four thousand specimens. The significant feature of this method of handling insectary material is the absolute systematizing of the routine work, the reduction of the size of the cage to a minimum and its style to the greatest possible simplicity. Laboratory conditions were made absolutely artificial, no attempt being made to reproduce a natural environment indoors. The data collected by this process was very accurate for the existing known conditions, and field observations and notes were very easily correlated with this data so that it could be applied to normal field conditions. Mr. HYSLOP stated that "our experience has convinced us of the feasibility of the following biological laboratory law: *The accuracy of biological laboratory observations is inversely proportional to the size of the cage and directly proportional to the thoroughness of the system of observing.*"

F. C. CRAIGHEAD: *Wood-boring insects.* In the past five years the author and several assistants have reared a great many coleopterous larvae. Stress was laid on the fact that the best results were secured

through the reproductions of conditions, as near as possible, to those existing in nature. Humidity was found to be the most important factor and by regulating this to a practically constant degree throughout the year the best results were obtained. To secure this result those types of cages which could be tightly closed were found most satisfactory, such as museum jars, fruit jars, and smaller phials with screw tops. For successful breeding of these insects it is necessary to know beforehand certain conditions under which they live. For instance, in each species of wood-boring beetles a decided preference is nearly always shown for a particular condition of wood. It may be green wood, that which is thoroughly seasoned, or perhaps that which has undergone a certain stage of decay. In such cases it is absolutely necessary to exactly duplicate this condition in order to propagate the species.

E. R. SELKREGG: *Fruit-infesting Lepidoptera.* The larvae of the codling moth and similar larvae are allowed to spin cocoons in pupation sticks where their transformation to pupae can be observed. These pupation sticks, one of which was exhibited, consist of a strip of wood with numerous sawcuts part way through, over which is placed a strip of transparent celluloid and then an uncut strip of wood. Glass battery jars are the most convenient rearing cages, furnishing approximately natural conditions for development of various stages. They are easily handled and quickly moved about the insectary. The insects develop in these jars at the same rate as in nature, according to definite observations.

R. A. CUSHMAN: *Hymenopterous parasites.* Rearing of these insects is very easy with almost any sort of jar, box, or phial, depending on the size of the specimen or amount of material. Moisture should be very sparingly employed. Host remains and cocoons of parasites should always be preserved as from them can be learned much regarding the habits and development of the parasite. Breeding of parasites as distinguished from rearing is a much more difficult matter. These insects are so strongly heliotropic that they spend practically all of their time in crawling about the top of the cage. The best results were obtained with small cages which brought the material to be parasitized close to the top and sides of the cage. Various types of small cages were described and exhibited and the method of handling them described. A small cage entirely of glass for photographing living insects was also described and photographs of cages and living insects were exhibited. After oviposition has been secured the treatment depends almost entirely on the nature of the host, and since insects of practically all sorts are attacked by parasites, the worker with parasites is perhaps more largely benefitted by the ideas brought out in such a symposium as this than any other.

S. A. ROHWER: *Insectaries.* The speaker stated that in constructing insectaries efforts should be made to approximate natural conditions, and as the amount of time available for discussion was limited he only called attention to a few points which had been gained from his experi-

ments in constructing insectaries at the Eastern Field Station of the Bureau of Entomology. It is important to confine the work done in an insectary to one type of rearing or to rearing of insects of one order. The cone type roof with broad eaves is much more satisfactory than any other type used. Illustrations and blue print plans of the insectaries of the Eastern Field Station were exhibited. The use of hinged wooded doors to afford protection and permit changes in ventilation was emphasized. It was pointed out that such means of protection is much more satisfactory than canvas curtains. Graphs showing how the temperature of an insectary protected by canvas curtains departed from the temperature of the surrounding air and varied much more than that of an insectary protected with wooden doors were presented. These graphs showed that even under the most favorable conditions of ventilation the temperature of the insectary protected with canvas curtains showed an unusual range and often departed as much as 15 degrees F. from the surrounding air. This forces the conclusion that unless it is possible to be at hand continually and alter the canvas curtains the use of canvas in the construction of insectaries is unsatisfactory. Mention was made of the value of a vestibule entrance for insectaries containing exotic insects, and also of the use of a dark room, with only one source of light, in removing insects from cages. It was recommended that an effort be made to standardize insectaries and that they be built on the sectional basis.

In discussing the preceding papers on rearing cages and devices, Mr. ROHWER called attention to the apparent differences in opinion between the previous speakers. One speaker had stated that he had better success under most artificial conditions; another speaker had emphasized the great importance of duplicating natural conditions; another had implied that humidity had but little effect. From the standpoint of the taxonomist it seems to be of great importance to know under what condition material was reared because there seems to be more variation in color in reared hymenoptera than in collected. The only way to explain this great variation in some forms is to assume that there was a difference in conditions under which they were reared. We know from experiments on Lepidoptera that melanistic or albinistic races can be produced by changing humidity. It is therefore only fair to the taxonomists that records of the kind of rearing devices and approximation of natural conditions be recorded.

Dr. QUAINTANCE described briefly the ingenious device perfected by Mr. R. L. Nougaret for the study of the grape phylloxera in California. The vines are planted in two large flower pots, one above the other and the whole placed in a deep pit. When it is necessary to examine the colonies of phylloxera the pots are raised out of the pit by means of a derrick. Mr. HEINRICH emphasized the necessity of having the food furnished to larvae in its natural condition, citing the formation of poison in the leaves of wild cherry after they are picked. Mr. GREENE stated that to rear diptera successfully natural conditions must be maintained.

R. A. CUSHMAN, *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

The Division of Mechanical Technology of the National Museum has constructed and placed on exhibition a model of the flying machine designed and constructed in 1491 by LEONARDO DA VINCI.

An unexpected result of the National Prohibition Act is the acquisition by the National Museum of an excellent skull of the mammoth, *Elephas primigenius*, the second specimen of its kind ever found in the United States. It had long been exhibited in a Cincinnati bar-room and the proprietor had refused all offers for it until prohibition rendered it valueless in its existing location, when it was acquired for a small sum by the Museum.

Mr. A. V. BLEININGER, ceramic chemist and head of the ceramic division of the Bureau of Standards, resigned in September to become research chemist for the Homer-Laughlin China Company, of East Liverpool, Ohio.

The Carnegie Institution of Washington published in September the second volume of *The Cactaceae*, by N. L. BRITTON and J. N. ROSE. An abstract of the first volume appeared in this JOURNAL for August, 1919. Two other volumes are yet to appear.

Dr. NORAH E. DOWELL, formerly instructor in geology at Smith College, has beeen appointed assistant geologist in the U. S. Geological Survey for duty as office geologist and research assistant in the Ground Water Division.

Dr. J. W. FEWKES, of the Bureau of American Ethnology, spent August in the excavation and repair of Cedar Tree Tower in the Mesa Verde National Park, Colorado.

Dr. AUGUST F. FOERSTE, of Dayton, Ohio, spent the summer in the Division of Paleontology of the National Museum, cooperating with Dr. R. S. BASSLER on a monograph of the Silurian cephalopods.

Mr. J. W. GIDLEY, of the section of vertebrate paleontology, U. S. National Museum, visited Williamsburg, Virginia, in September, to investigate the discovery of remains of an extinct species of whale, reported by Dr. DONALD W. DAVIS, of the College of William and Mary. Material was secured for the Museum, although not sufficient for a skeleton mount.

Mr. A. K. HAAGNER, director of the zoological park at Pretoria, South Africa, visited Washington in September, on his way to London. Mr. Haagner came to the United States in charge of a shipload of African animals which had been collected at Pretoria during the war for various American zoological parks, and which arrived at Philadelphia in September.

Dr. RODNEY B. HARVEY, formerly plant physiologist in the Bureau of Plant Industry, U. S. Department of Agriculture, has resigned to accept the position of assistant professor of plant physiology at the University of Minnesota and assistant plant physiologist at the Minnesota Experiment Station.

Mr. P. C. HOLDT has been appointed research associate at the Bureau of Standards, representing the American Paint and Varnish Manufacturers' Association.

Dr. T. HARVEY JOHNSTON, of Queensland, visited the National Museum in September, on a mission to various parts of North and South America for the purpose of studying the cactus and means of controlling it.

Mr. BENJAMIN R. JACOBS has resigned from the Bureau of Chemistry, U. S. Department of Agriculture, to become director of the National Cereal Products Laboratories, with offices in Washington.

Mr. NEIL M. JUDD, Curator of American Archeology, U. S. National Museum, returned to Washington October 1st, after having spent the spring and summer months in the Southwest, engaged in archeological research for the Bureau of American Ethnology and the National Geographic Society.

Mr. ALAN LEIGHTON, formerly chemist with the Bureau of Mines at Pittsburgh, has been transferred to the Bureau of Animal Industry, U. S. Department of Agriculture.

Dr. WILLIAM A. LOCY, professor of biology at Northwestern University, and author of *Biology and its makers*, spent the summer in Washington in historical research, chiefly in the library of the Surgeon General's Office.

Mr. H. C. RAVEN, zoological collector and naturalist with the Smithsonian African Expedition under the direction of Mr. EDMUND HELLER, returned to Washington on September 21.

Mr. E. J. RUH has been appointed research assistant at the Bureau of Standards by the International Nickel Company.

Miss LILY B. SEFTON, formerly of the Bureau of Stndards, has been appointed assistant professor in the department of chemistry of the University of West Virginia, at Morgantown, West Virginia.

Dr. R. J. TILLYARD, director of the Cawthron Institute of Scientific Research at Nelson, New Zealand, visited Washington during the summer. Dr. Tillyard has spent seventeen years in Australia, devoting himself to research on the Neuropteroid insects, recent and fossil. He returned to New Zealand in October.